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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/720,752	11/25/2003	Emiel Jozef Melanie Eussen	081468-0306993	2765

909 7590 08/16/2007
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TURNER, SAMUEL A	

ART UNIT	PAPER NUMBER
2877	

MAIL DATE	DELIVERY MODE
08/16/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/720,752	Applicant(s) EUSSEN ET AL.	
	Examiner Samuel A. Turner	Art Unit 2877	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 29 May 2007.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-24 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-24 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Abstract

The abstract of the disclosure is objected to because the form and legal phraseology often used in patent claims must be avoided. Correction is required. See MPEP § 608.01(b).

The amendment filed 29 May 2007 includes an amendment to the abstract, however no abstract is present in the file. Page 20 is missing from the response.

Drawings

Arguments directed to the objection to the drawings are persuasive. Figures 1-3 are directed to only a portion of the invention.

Claim Rejections - 35 USC § 112, first paragraph

Applicant's amendment has overcome the rejection of claims 3-9, and 11-17 under 35 U.S.C. § 112, second paragraph.

Claim Rejections - 35 USC § 112, second paragraph

Applicant's amendment has overcome the rejection of claims 3-24 under 35 U.S.C. § 112, second paragraph.

Claim Rejections - 35 USC § 102

Applicant's amendment has overcome the rejection of claims 1-4, and 9 under 35 U.S.C. § 102(b) as anticipated by Sommargren(4,859,066).

The following is a quotation of the appropriate paragraphs of 35 U.S.C. § 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-4, 7, 9-12, 15, 17-19, 22, and 24 are rejected under 35 U.S.C. § 102(e) as being clearly anticipated by Hill(6,819,434).

FIG. 2A

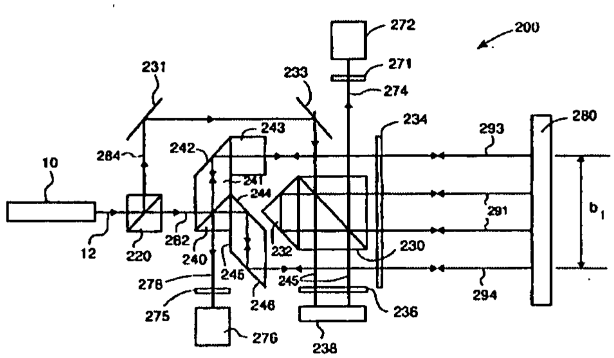


FIG. 2B

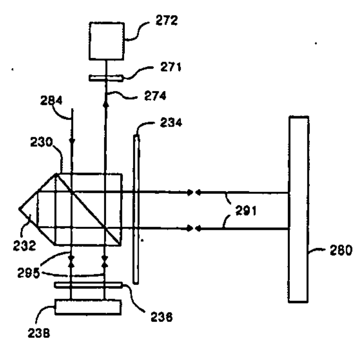


FIG. 2C

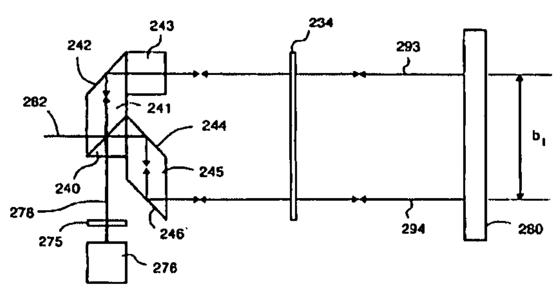


FIG. 2E

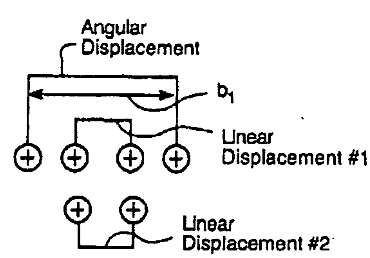
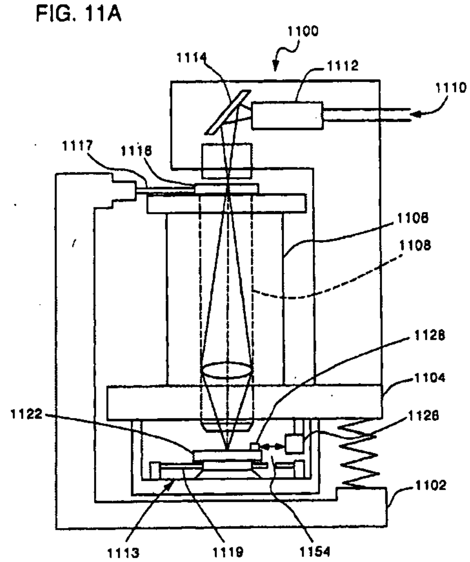


FIG. 11A



With regard to claim 1, Hill teaches an interferometer system for measuring displacement, along at least two directions within a three dimensional system of coordinates, of an object in a plane substantially parallel to a two dimensional plane(Fig's 2A-2C), said interferometer system comprising:

a plane mirror interferometer system(Fig. 2B);

a differential plane mirror interferometer system(Fig. 2C);

a beam-splitter(Fig. 2A; 220,230,232,240-246) configured to split a radiation beam associated with said plane mirror interferometer system(Fig. 2A, 284) and a radiation beam associated with said differential plane mirror interferometer system(Fig. 2A, 282) into respective measuring beams(Fig. 2A; 291,294) and respective reference beams(Fig. 2A; 245,293);

at least one measuring mirror(Fig. 2A, 280) fixedly connected to said object and comprising a plurality of measuring mirror areas;

at least one reference mirror(**Fig. 2A, 238**) comprising one or more reference mirror areas,

wherein, in use, a direction of propagation of the reference beam associated with the differential plane mirror interferometer system just before incidence on a reference mirror is in a direction substantially orthogonal to the direction of the reference beam associated with the plane mirror interferometer just before incidence on a reference mirror(**beam 293 is orthogonal to beam 245**).

As to claim 2/1, wherein said beam-splitter includes a transparent body having a beam-splitting surface(**Fig. 2A; 240, 241**) and a first reflector(**Fig. 2A, 242**) which is integrally connected to said transparent body and which has a reflective surface that extends substantially parallel to the beam-splitting surface.

With regard to claim 3, Hill teaches an interferometer system for measuring displacement along at least two directions in an XYZ system of co-ordinates, of an object in a plane substantially parallel to an XY plane(**Fig's 2A-2C**), said interferometer system comprising:

at least one measuring mirror fixedly connected to said object and comprising a plurality of measuring mirror areas(**Fig. 2A, 280**);

at least one reference mirror comprising one or more reference mirror areas(**Fig. 2A, 283**);

a beam generator configured to generate a plurality of radiation beams, said beam generator comprising a beam-splitter block having a beam-splitting surface(**Fig. 2A; 220,230,232,240-246**);

a plurality of radiation-sensitive detectors configured to convert radiation beams reflected towards said detectors into electric measuring signals(**Fig. 2A; 272, 276**);

wherein said beam-splitter block is configured to split at least one first beam of said plurality of radiation beams into a first measuring beam and a first reference beam(**Fig. 2A; 291,245**), said first reference beam only being reflected by one or more first reference mirrors(**Fig. 2A, 238**) located in a fixed position with respect to said beam-splitter block, said first measuring beam being reflected by a first measuring mirror area(**Fig. 2A, at point of reflection of beam 291**) of said plurality of measuring mirror areas, and

wherein said beam-splitter block is configured to split at least one second beam of said plurality of radiation beams into a second measuring beam and a second reference beam(**Fig. 2A; 294,293**), said second measuring beam being reflected by a second measuring mirror area of said plurality of measuring mirror areas(**Fig. 2A, at point of reflection of beam 294**), and said second reference beam being reflected by a first reflector(**Fig. 2A, 242**) that is fixedly positioned with respect to said beam-splitter block and by at least one third mirror area(**Fig. 2A, at**

point of reflection of beam 293), which is movable with respect to said beam-splitter block, and

wherein, in use, the second reference beam associated with the at least one second beam exits the first reflector in a direction substantially orthogonal to the direction of the first reference beam associated with the at least one first beam exits the beam-splitter block(**beam 293 is orthogonal to beam 245**).

As to claim 4/3, wherein said at least one third mirror area comprises a third measuring mirror area fixed to said object(**Fig. 2A, at point of reflection of beam 293**).

As to claim 7/3, wherein said plurality of radiation beams comprises at least three first radiation beams occupying more than one plane and at least one second radiation beam in a position between two of said at least three first radiation beams(**Fig. 2E**).

As to claim 9/3, wherein said beam-splitter block comprises a transparent body having a beam-splitting surface and the first reflector is integrally connected to said transparent body and has a reflective surface that extends substantially parallel to the beam-splitting surface(**Fig. 2A, 240-242**).

With regard to claim 10, Hill teaches a lithographic apparatus(**Fig's 2A-2C, 11A**) comprising:

an illumination system configured to provide a beam of radiation(**Fig. 11A; 1110,1112,1114**);

a pattern support configured to support a patterning device that serves to impart said beam of radiation with a pattern in its cross-section(**Fig. 11A, 1116**);

a substrate support configured to hold a substrate(**Fig. 11A, 1122**);

a projection system configured to project said patterned beam onto a target portion of the substrate(**Fig. 11A, 1108**); and

an interferometer system configured to measure displacement of one of the supports(**Fig's 2A-2C**), wherein said interferometer system comprises,

a plane mirror interferometer system(**Fig. 2B**);

a differential plane mirror interferometer system(**Fig. 2C**);

a beam-splitter block(**Fig. 2A; 220,230,232,240-246**) containing one beam-splitter(**Fig. 2A; 220,230,240**), at least one mirror(**Fig. 2A; 231,233**), and at least one retro-reflector(**Fig. 2A, 232**), such that said beam splitter block is configured to split a beam associated with said plane mirror interferometer system and a beam associated with said differential plane mirror interferometer system into respective measuring beams(**Fig. 2A; 291,294**) and respective reference beams(**Fig. 2A; 245,293**);

at least one measuring mirror fixedly connected to said one of the supports and comprising a plurality of measuring mirror areas(**Fig. 2A, 280**);

at least one reference mirror comprising one or more reference mirror areas(**Fig. 2A, 238**), and

wherein, in use, a direction of propagation of the reference beam associated with the differential plane mirror interferometer system just before incidence on a reference mirror is in a direction substantially orthogonal to the direction of the reference beam associated with the plane mirror interferometer just before incidence on a reference mirror(**beam 293 is orthogonal to beam 245**).

With regard to claim 11, Hill teaches a lithographic apparatus(**Fig's 2A-2C, 11A**) comprising:

an illumination system configured to provide a beam of radiation(**Fig. 11A; 1110,1112,1114**);

a pattern support configured to support a patterning device that serves to impart said beam of radiation with a pattern in its cross-section(**Fig. 11A, 1116**);

a substrate support holder configured to hold a substrate(**Fig. 11A, 1122**);

a projection system configured to project said patterned beam onto a target portion of the substrate(**Fig. 11A, 1108**); and

an interferometer system configured to measure displacement of one of the supports(**Fig's 2A-2C**), wherein said interferometer system comprises,

at least one measuring mirror fixedly connected to one of the supports and comprising a plurality of measuring mirror areas(**Fig. 2A, 280**);

at least one reference mirror comprising one or more reference mirror areas(**Fig. 2A, 238**);

a beam generator configured to generate a plurality of radiation beams, said beam generator comprising a beam-splitter block having a beam-splitting surface(**Fig. 2A; 220,230,232,240-246**);

a plurality of radiation-sensitive detectors configured to convert radiation beams reflected towards said detectors into electric measuring signals(**Fig. 2A; 272,276**);

wherein said beam-splitter block is configured to split at least one first beam of said plurality of radiation beams into a first measuring beam and a first reference beam(**Fig. 2A; 291,245**), said first reference beam only being reflected by one or more first reference mirrors(**Fig. 2A, 238**) located in a fixed position with respect to said beam-splitter block, said first measuring beam being reflected by a first measuring mirror area(**Fig. 2A, at point of reflection of beam 291**) of said plurality of measuring mirror areas, and

wherein said beam-splitter block is configured to split at least one second beam of said plurality of radiation beams into a second measuring beam and a second reference beam(**Fig. 2A; 294,293**), said second measuring beam being reflected by a second measuring mirror area of said plurality of measuring mirror areas(**Fig. 2A, at point of reflection of beam 294**), and said second reference beam being reflected by a first reflector(**Fig. 2A, 242**) that is fixedly positioned with respect to said beam-splitter block and by at least one third mirror area(**Fig. 2A, at**

point of reflection of beam 293), which is movable with respect to said beam-splitter block, and

wherein, in use, the second reference beam associated with the at least one second beam exits the first reflector in a direction substantially orthogonal to the direction of the first reference beam associated with the at least one first beam exits the beam-splitter block(**beam 293 is orthogonal to beam 245)**.

As to claim 12/11, wherein said at least one third mirror area comprises a third measuring mirror area fixed to said one of the supports(**Fig. 2A, at point of reflection of beam 293)**.

As to claim 15/11, wherein said plurality of radiation beams comprises at least three first radiation beams occupying more than one plane and at least one second radiation beam in a position between two of said at least three first radiation beams(**Fig. 2E)**.

As to claim 17/11, wherein said beam-splitter block comprises a transparent body having a beam-splitting surface and the first reflector is integrally connected to said transparent body and has a reflective surface that extends substantially parallel to the beam splitting surface(**Fig. 2A; 240-242)**.

With regard to claim 18, Hill teaches a device manufacturing method comprising:

providing a beam of radiation using an illumination system(**column 36, lines 9-18)**;

using a patterning device to impart the beam of radiation with a pattern in its cross-section, the patterning device supported by a pattern support(**column 36, lines 9-18)**;

projecting said patterned beam of radiation onto a target portion of t-he a substrate, the substrate held by a substrate support(**column 36, lines 9-18)**; and

determining a position of one of the supports with an interferometer system(**column 35, lines 42-43)**, the determining including

splitting at least a first beam of a plurality of beams, via a beam-splitter block having a beam-splitting surface, into a first measuring beam and a first reference beam, said first reference beam only being reflected by one or more first reference mirrors located in a fixed position with respect to said beam-splitter block, said first measuring beam being reflected by a first measuring mirror area of said a plurality of measuring mirror areas, the plurality of measuring mirror areas part of at least one measuring mirror fixedly connected to the one of the supports(**column 14, line 58- column 15, line 18)**, and

splitting at least a second beam of said plurality of beams, via said beam beam-splitter block, into a second measuring beam and a second reference beam, said second measuring beam being reflected by a second measuring mirror area of said plurality of measuring mirror areas, and said second reference beam being reflected by a first reflector that is fixedly positioned with respect to said beam-splitter block and by at least one third mirror area, which is movable with respect to

said beam-splitter block, and said second reference beam being reflected in a substantially orthogonal direction with respect to the first reference beam by the first reflector(**column 15, lines 31-56**), and

converting beams which are reflected towards said detectors into electric measuring signals(**column 15, lines 25 and 55**).

As to claim 19/18, wherein said at least one third mirror area of said interferometer system comprises a third measuring mirror area fixed to said one of the supports(**Fig. 2A, 280**).

As to claim 22/18, wherein said plurality of beams of said interferometer system comprises at least three first radiation beams occupying more than one plane and at least one second radiation beam in a position between two of said at least three first radiation beams(**Fig. 2E**).

As to claim 24/18, wherein said beam-splitter block of said interferometer system comprises a transparent body having a beam-splitting surface and the first reflector is integrally connected to said transparent body and has a reflective surface that extends substantially parallel to the beam splitting surface(**Fig. 2A; 240-242**).

Claims 1-4, 9-12, 17-19, and 24 are rejected under 35 U.S.C. § 102(b) as being clearly anticipated by Van Den Brink(5,801,832).

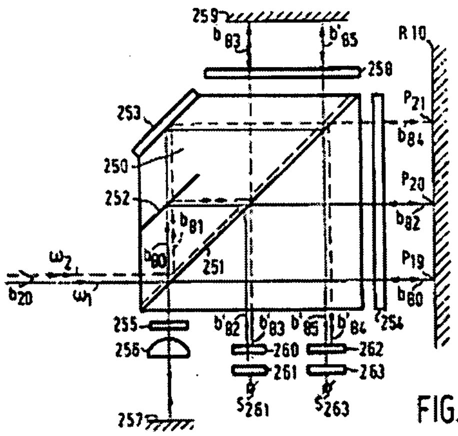


FIG.24

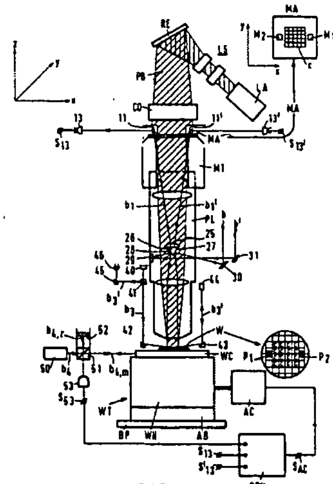


FIG.1

With regard to claim 1, Van Den Brink teaches an interferometer system for measuring displacement, along at least two directions within a three dimensional system of coordinates, of an object in a plane substantially parallel to a two dimensional plane(Fig. 24), said interferometer system comprising:

a plane mirror interferometer system(Fig. 24; **beams** b82,b83);

a differential plane mirror interferometer system(Fig. 24; **beams** b80,b84);

a beam-splitter(Fig. 24, 251,251) configured to split a radiation beam associated with said plane mirror interferometer system(Fig. 24;b82,b83) and a radiation beam associated with said differential plane mirror interferometer system(Fig. 24; b80,b84) into respective measuring beams(Fig. 24; b80,b82) and respective reference beams(Fig. 24; b83,b84);

at least one measuring mirror fixedly connected to said object and comprising a plurality of measuring mirror areas(**Fig. 24, R10**);

at least one reference mirror comprising one or more reference mirror areas(**Fig. 24, 239**),

wherein, in use, a direction of propagation of the reference beam associated with the differential plane mirror interferometer system just before incidence on a reference mirror is in a direction substantially orthogonal to the direction of the reference beam associated with the plane mirror interferometer just before incidence on a reference mirror(**beam b83 is orthogonal to b84**).

As to claim 2/1, wherein said beam-splitter includes a transparent body having a beam-splitting surface(**Fig. 24, 251**) and a first reflector which is integrally connected to said transparent body and which has a reflective surface(**Fig. 24, 253**) that extends substantially parallel to the beam-splitting surface.

With regard to claim 3, Van Den Brink teaches an interferometer system for measuring displacement along at least two directions in an XYZ system of co-ordinates(**Fig. 24**), of an object in a plane substantially parallel to an XY plane, said interferometer system comprising:

at least one measuring mirror fixedly connected to said object and comprising a plurality of measuring mirror areas(**Fig. 24, R10**);

at least one reference mirror comprising one or more reference mirror areas(**Fig. 24, 239**);

a beam generator configured to generate a plurality of radiation beams(Fig. 24, 250), said beam generator comprising a beam-splitter block having a beam-splitting surface(Fig. 24; 251,252);

a plurality of radiation-sensitive detectors configured to convert radiation beams reflected towards said detectors into electric measuring signals(Fig. 24; 261,263);

wherein said beam-splitter block is configured to split at least one first beam of said plurality of radiation beams into a first measuring beam and a first reference beam(Fig. 24; b82,b83), said first reference beam only being reflected by one or more first reference mirrors located in a fixed position with respect to said beam-splitter block(Fig. 24, 239), said first measuring beam being reflected by a first measuring mirror area of said plurality of measuring mirror areas(Fig. 24, P20), and

wherein said beam-splitter block is configured to split at least one second beam of said plurality of radiation beams into a second measuring beam and a second reference beam(Fig. 24; b80,b84), said second measuring beam being reflected by a second measuring mirror area of said plurality of measuring mirror areas(Fig. 24, P19), and said second reference beam being reflected by a first reflector that is fixedly positioned with respect to said beam-splitter block(Fig. 24, 253) and by at least one third mirror area(Fig. 24, P21), which is movable with respect to said beam-splitter block, and

wherein, in use, the second reference beam associated with the at least one second beam exits the first reflector in a direction substantially orthogonal to the direction of the first reference beam associated with the at least one first beam exits the beam-splitter block(**beam b83 is orthogonal to b84**).

As to claim 4/3, wherein said at least one third mirror area comprises a third measuring mirror area fixed to said object(**Fig. 24, P21**).

As to claim 9/3, wherein said beam-splitter block comprises a transparent body having a beam-splitting surface and the first reflector is integrally connected to said transparent body and has a reflective surface that extends substantially parallel to the beam-splitting surface(**Fig. 24, 250-253**).

With regard to claim 10, Van Den Brink teaches a lithographic apparatus(**Fig. 1**) comprising:

an illumination system configured to provide a beam of radiation(**Fig. 1, LA**);

a pattern support configured to support a patterning device that serves to impart said beam of radiation with a pattern in its cross-section(**Fig. 1, MT**);

a substrate support configured to hold a substrate(**Fig. 1, WT**);

a projection system configured to project said patterned beam onto a target portion of the substrate(**Fig. 1, PL**); and

an interferometer system configured to measure displacement of one of the supports (**Fig. 24**), wherein said interferometer system comprises,

a plane mirror interferometer system(**Fig. 24; beams b82,b83**);

a differential plane mirror interferometer system(**Fig. 24; beams b80,b84**);

a beam-splitter(**Fig. 24, 251,251**) configured to split a radiation beam associated with said plane mirror interferometer system(**Fig. 24;b82,b83**) and a radiation beam associated with said differential plane mirror interferometer system(**Fig. 24; b80,b84**) into respective measuring beams(**Fig. 24; b80,b82**) and respective reference beams(**Fig. 24; b83,b84**);

at least one measuring mirror fixedly connected to said one of the supports and comprising a plurality of measuring mirror areas(**Fig. 24, R10**);

at least one reference mirror comprising one or more reference mirror areas(**Fig. 24, 239**),

wherein, in use, a direction of propagation of the reference beam associated with the differential plane mirror interferometer system just before incidence on a reference mirror is in a direction substantially orthogonal to the direction of the reference beam associated with the plane mirror interferometer just before incidence on a reference mirror(**beam b83 is orthogonal to b84**).

With regard to claim 11, Van Den Brink teaches a lithographic apparatus(**Fig. 1**) comprising:

an illumination system configured to provide a beam of radiation(**Fig. 1, LA**);

a pattern support configured to support a patterning device that serves to impart said beam of radiation with a pattern in its cross-section(**Fig. 1, MT**);

a substrate support holder configured to hold a substrate(**Fig. 1, WT**);

a projection system configured to project said patterned beam onto a target portion of the substrate(Fig. 1, PL); and

an interferometer system configured to measure displacement of one of the supports(Fig. 24), wherein said interferometer system comprises,

at least one measuring mirror fixedly connected to the one of the supports and comprising a plurality of measuring mirror areas(Fig. 24, R10);

at least one reference mirror comprising one or more reference mirror areas(Fig. 24, 239);

a beam generator configured to generate a plurality of radiation beams(Fig. 24, 250), said beam generator comprising a beam-splitter block having a beam-splitting surface(Fig. 24; 251,252);

a plurality of radiation-sensitive detectors configured to convert radiation beams reflected towards said detectors into electric measuring signals(Fig. 24; 261,263);

wherein said beam-splitter block is configured to split at least one first beam of said plurality of radiation beams into a first measuring beam and a first reference beam(Fig. 24; b82,b83), said first reference beam only being reflected by one or more first reference mirrors located in a fixed position with respect to said beam-splitter block(Fig. 24, 239), said first measuring beam being reflected by a first measuring mirror area of said plurality of measuring mirror areas(Fig. 24, P20), and

wherein said beam-splitter block is configured to split at least one second beam of said plurality of radiation beams into a second measuring beam and a second reference beam(**Fig. 24; b80,b84**), said second measuring beam being reflected by a second measuring mirror area of said plurality of measuring mirror areas(**Fig. 24, P19**), and said second reference beam being reflected by a first reflector that is fixedly positioned with respect to said beam-splitter block(**Fig. 24, 253**) and by at least one third mirror area(**Fig. 24, P21**), which is movable with respect to said beam-splitter block, and

wherein, in use, the second reference beam associated with the at least one second beam exits the first reflector in a direction substantially orthogonal to the direction of the first reference beam associated with the at least one first beam exits the beam-splitter block(**beam b83 is orthogonal to b84**).

As to claim 12/11, wherein said at least one third mirror area comprises a third measuring mirror area fixed to said one of the supports(**Fig. 24, P21**).

As to claim 17/11, wherein said beam-splitter block comprises a transparent body having a beam-splitting surface and the first reflector is integrally connected to said transparent body and has a reflective surface that extends substantially parallel to the beam splitting surface(**Fig. 24, 250-253**).

With regard to claim 18, Van Den Brink teaches a device manufacturing method comprising:

providing a beam of radiation using an illumination system(**column 8, lines 50-65**);

using a patterning device to impart the beam of radiation with a pattern in its cross-section, the patterning device supported by a pattern support(**column 8, lines 50-65**);

projecting said patterned beam of radiation onto a target portion of t-he a substrate, the substrate held by a substrate support(**column 8, lines 50-65**); and

determining a position of one of the supports with an interferometer system, the determining(**column 9, lines 5-9**) including

splitting at least a first beam of a plurality of beams, via a beam-splitter block having a beam-splitting surface, into a first measuring beam and a first reference beam, said first reference beam only being reflected by one or more first reference mirrors located in a fixed position with respect to said beam-splitter block, said first measuring beam being reflected by a first measuring mirror area of said a plurality of measuring mirror areas, the plurality of measuring mirror areas part of at least one measuring mirror fixedly connected to the one of the supports(**column 31, lines 2-20**), and

splitting at least a second beam of said plurality of beams, via said beam beam-splitter block, into a second measuring beam and a second reference beam, said second measuring beam being reflected by a second measuring mirror area of said plurality of measuring mirror areas, and said second reference beam being

reflected by a first reflector that is fixedly positioned with respect to said beam-splitter block and by at least one third mirror area, which is movable with respect to said beam-splitter block(**column 31, lines 21-35**), and said second reference beam being reflected in a substantially orthogonal direction with respect to the first reference beam by the first reflector(**beam b83 is orthogonal to b84**), and

converting beams which are reflected towards said detectors into electric measuring signals(**column 31, lines 9 and 28**).

As to claim 19/18, wherein said at least one third mirror area of said interferometer system comprises a third measuring mirror area fixed to said one of the supports(**Fig. 24, P21**).

As to claim 24/18, wherein said beam-splitter block of said interferometer system comprises a transparent body having a beam-splitting surface and the first reflector is integrally connected to said transparent body and has a reflective surface that extends substantially parallel to the beam splitting surface(**Fig. 24, 250-253**).

Claim Rejections - 35 USC § 103

Applicant's amendment has overcome the rejection of claims 5-8, and 10-24 under 35 U.S.C. § 103(a) as unpatentable over Sommargren(4,859,066) in view of Loopstra et al(6,020,964).

The following is a quotation of 35 U.S.C. § 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. § 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR § 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. § 103(c) and potential 35 U.S.C. § 102(e), (f) or (g) prior art under 35 U.S.C. § 103(a).

Claims 8, 16, and 23 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Hill(6,819,434).

As to claims 8/3, 16/11, and 23/18; Hill **fails to teach** wherein said plurality of radiation beams comprises at least three first radiation beams arranged to occupy a polygonal volume and at least one second radiation beam arranged to be in a position outside a polygonal volume.

CLAIMS 8, 16, and 23:

Hill teaches adding an additional beam-splitter into the beam-splitter assembly in order to measure additional directions(**column 17, lines 22-30**).

With regard to claims 8, 16, and 23; it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Hill by adding at least one additional beam-splitter between the source 10 and the beam-

splitter 220 in order to provide a third linear displacement(#3) above the linear displacement #1, see figure 2E.

The motivation for this modification is found in Hill which would have been to measure additional directions.

Claims 5, 6, 13, 14, 20, and 21 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Hill(6,819,434) in view of Loopstra et al(6,020,964).

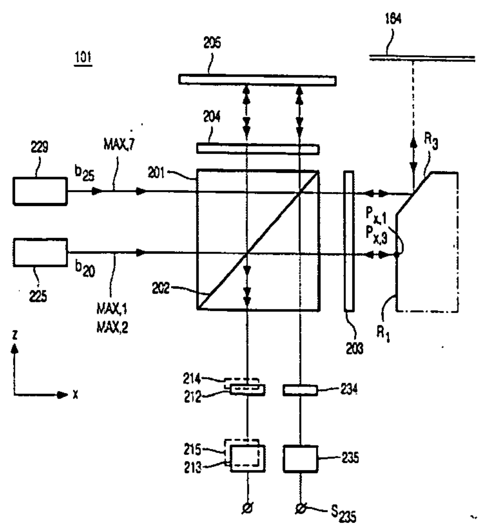


FIG. 11

As to claim 5/3, Hill **fails to teach** wherein said at least one third mirror area comprises

a second reflector fixed to said object and a second reference mirror area located in a fixed position with respect to said beam-splitter block,

wherein said second reflector is arranged to direct said second reference beam towards said second reference mirror area.

As to claim 6/3, Hill **fails to teach** wherein at least one third mirror area comprises a fourth mirror area which is fixed to a second object, which is movable with respect to the beam-splitter block.

As to claim 13/11, Hill **fails to teach** wherein said at least one third mirror area comprises a second reflector fixed to said one of the supports and a second reference mirror area located in a fixed position with respect to said beam-splitter block, wherein said second reflector is arranged to direct said second reference beam towards said second reference mirror area.

As to claim 14/11, Hill **fails to teach** wherein at least one third mirror area comprises a fourth mirror area which is fixed to a second object, which is movable with respect to the beam-splitter block.

As to claim 20/18, Hill **fails to teach** wherein said at least one third mirror area of said interferometer system comprises a second reflector fixed to said one of the supports and a second reference mirror area located in a fixed position with respect to said beam-splitter block, wherein said second reflector is arranged to direct said second reference beam towards said second reference mirror area.

As to claim 21/18, Hill **fails to teach** wherein said at least one third mirror area of said interferometer system comprises a fourth mirror area which is fixed to a second object which is movable with respect to the beam-splitter block.

CLAIMS 5, 6, 13, 14, 20, and 21:

Loopstra et al teach an additional mirror arrangement where a reflector R3 is placed onto the movable stage to deflect one of the beams to an additional reflector 164 mounted onto the projection system. This provides an additional measurement direction along the Z axis when the stage is displaced in the Z direction.

With regard to claims 5, 6, 13, 14, 20, and 21; it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Hill by placing addition reflectors, along an additional axis #3(see the rejection of claims 8, 16, and 23) and on the optics 1108, to measure displacements in the X and Z directions instead of the X and θ directions.

The motivation for this modification is found in Loopstra et al which would have been to measure the Z direction relative to the stage.

Claims 5, 6, 13, 14, 20, and 21 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Van Den Brink(5,801,832) in view of Loopstra et al(6,020,964).

As to claim 5/3, Van Den Brink **fails to teach** wherein said at least one third mirror area comprises

a second reflector fixed to said object and a second reference mirror area located in a fixed position with respect to said beam-splitter block,

wherein said second reflector is arranged to direct said second reference beam towards said second reference mirror area.

As to claim 6/3, Van Den Brink **fails to teach** wherein at least one third mirror area comprises a fourth mirror area which is fixed to a second object, which is movable with respect to the beam-splitter block.

As to claim 13/11, Van Den Brink **fails to teach** wherein said at least one third mirror area comprises a second reflector fixed to said one of the supports and a second reference mirror area located in a fixed position with respect to said beam-splitter block, wherein said second reflector is arranged to direct said second reference beam towards said second reference mirror area.

As to claim 14/11, Van Den Brink **fails to teach** wherein at least one third mirror area comprises a fourth mirror area which is fixed to a second object, which is movable with respect to the beam-splitter block.

As to claim 20/18, Van Den Brink **fails to teach** wherein said at least one third mirror area of said interferometer system comprises a second reflector fixed to said one of the supports and a second reference mirror area located in a fixed position with respect to said beam-splitter block, wherein said second reflector is arranged to direct said second reference beam towards said second reference mirror area.

As to claim 21/18, Van Den Brink **fails to teach** wherein said at least one third mirror area of said interferometer system comprises a fourth mirror area which is fixed to a second object which is movable with respect to the beam-splitter block.

CLAIMS 5, 6, 13, 14, 20, and 21:

With regard to claims 5, 6, 13, 14, 20, and 21; it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Van Den Brink by placing addition reflectors, for example at P21 and on the optics PL, to measure displacements in the X and Z directions instead of the X and θ directions.

The motivation for this modification is found in Loopstra et al which would have been to measure the Z direction relative to the stage.

Response to Arguments

Applicant's arguments with respect to claims 1-24 have been considered but are moot in view of the new ground(s) of rejection.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Samuel A. Turner whose phone number is 571-272-2432.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory J. Toatley, Jr., can be reached on 571-272-2800 ext. 77.

The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Samuel A. Turner
Primary Examiner
Art Unit 2877